Ecological Constraints Assessment

369 Jacks Corner Road Kangaroo Valley

Report prepared by Narla Environmental

for

The Scots College, Glengarry Campus

October 2024

NARLA
environmental

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Narla Environmental Pty Ltd
www.narla.com.au

Report Certification

Works for this report were undertaken by:

Staff Name	Position
Chris Moore *BBioCon*	Narla Environmental General Manager and Principal Ecologist
Brodie Miller *BA MEnvMgt*	Narla Environmental Project Manager and Ecologist
Allirah Wallace *BSc/BAdSt (Hons)*	Narla Environmental Ecologist

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Glossary

Acronym/ Term	Definition
BAM	Biodiversity Assessment Method
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
ECA	Ecological Constraints Assessment
DA	Development Application
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
Development	The use of land, and the subdivision of land, and the carrying out of a work, and the demolition of a building or work, and the erection of a building, and any other act, matter or thing referred to in section 26 that is controlled by an environmental planning instrument but does not include any development of a class or description prescribed by the regulations for the purposes of this definition (Environmental Planning and Assessment Act 1979).
DEC	Department of Environment and Conservation
DPE	Department of Planning and Environment (formerly DPIE)
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment (now DPE)
EP&A Act	Environmental Planning & Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
FFA	Flora and Fauna Assessment Report
ha	Hectares
km	Kilometre
LEP	Local Environmental Plan
LGA	Local Government Area
Locality	The area within a 10km radius of the Subject Property. The same meaning when describing a local population of a species or local occurrence of an ecological community.
m	metres
mm	millimetres
NSW	New South Wales
OEH	Office of Environment and Heritage (now DPE)
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
Subject Property	369 Jacks Corner Road, Kangaroo Valley (Lot 27/-/DP 881838)
TEC	Threatened Ecological Community
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016

1. Introduction

1.1 Project Background

Narla Environmental Pty Ltd (Narla) was engaged by Scots College (the Proponent) to prepare an Ecological Constraints Assessment (ECA). The purpose of this assessment is to determine the ecological constraints for a Masterplan involving the construction of additional staff housing, student accommodation, administration buildings, and workshops, with potential additional Asset Protection Zone (APZ) management at Scots College's Glengarry Campus, located at 369 Jacks Corner Road, Kangaroo Valley (Lot 27/DP 881838). This site will hereafter be referred to as the 'Subject Property' (**Figure 1; Appendix C**).

The Subject Property has been defined by cadastral boundaries (NSW SIX Maps 2024). The proposed additional APZ management of the vegetation, particularly along the western boundary adjacent to the existing developed area, has already been identified as an area with potential ecological constraints in the Bushfire Assessment Report prepared by Building Code & Bushfire Hazard Solutions (2024; **Appendix D**).

This report will focus on the ecological constraints associated with environmental planning instruments, as well as Threatened Ecological Communities (TECs) and threatened species listed under the Biodiversity Conservation Act 2016 (BC Act) and the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act). The areas covered by the Masterplan for the proposed development will be referred to as the 'Subject Site' and comprises of an area covering approximately 16.2ha(**Figure 1; Appendix C**).

Narla has produced this report to assess any potential impacts associated with future development proposals and to recommend appropriate measures to mitigate any potential ecological impacts.

1.2 Site Description and Location

The Subject Property is located off Jacks Corner Road in Kangaroo Valley, within the Shoalhaven Council Local Government Area (LGA). Covering an area of approximately 275.12 ha, the Subject Property includes native remnant bushland and a central area with partially cleared land, buildings, and roadways corresponding to the site's existing educational and recreational use. The property is surrounded by similar bushland properties and acreages typical of the area.

1.3 Topography, Geology and Soil

The Subject Site is located on a south-facing slope, ranging from 122 meters above sea level (asl) in the north to 74 meters asl in the south (Google Earth 2024). It lies on geology from the Shoalhaven Group, characterized by polymictic pebble paraconglomerate, fine-grained muddy lithic sandstone, sandy micaceous siltstone, minor shale, sporadic minor carbonate and evaporite, and sporadically bioturbated sandstone with abundant fossil shell fragments and dropstones (Department of Regional NSW Minview 2024).

1.4 Hydrology

One (1) mapped 1st order watercourses is located within the Subject Site (**Figure 1**). One (1) unmapped waterbody in the form of a small dam was also identified within the Subject Site.

1.5 Scope of Assessment

The objectives of this ECA were to assess possible ecological constraints associated with future development within the Subject Site pursuant to Part 4 of the Environmental Planning & Assessment Act 1979 (EP&A Act), the BC Act, the EPBC Act and the local planning provisions of the Shoalhaven Council, including to:

- Undertake background research to determine the likelihood for NSW and/or Commonwealth threatened biota to utilise or occur within the Subject Property during any point of their lifecycles;
- Establish the likelihood of occurrence of migratory species, threatened species, endangered populations and threatened ecological communities as listed under the BC Act and/or the EPBC Act;
- Identify and map the distribution of vegetation communities within the Subject Property and discuss patch size and condition;
- Record presence and the extent of any Priority Weed infestations that require management by law;
- Determine potential ecological impacts or risks that may result due to the proposed works;
- Recommendation of any controls or additional actions to be taken to protect or improve environmental outcomes of the proposed works; and
- Recommend any controls or additional actions to be taken to protect or improve ecological/biodiversity values of the Subject Property.

1.6 Study Limitations

This study was not intended to provide a complete inventory of all flora and fauna species with potential to occur in the Subject Site. The species list provided for the site in this report was restricted to what was observed during the site visit by the Narla Ecologists. The timing of the surveys may not have coincided with emergence times of some species of flora and fauna, such as seasonally flowering herbs, seasonal migratory fauna or nocturnal fauna.

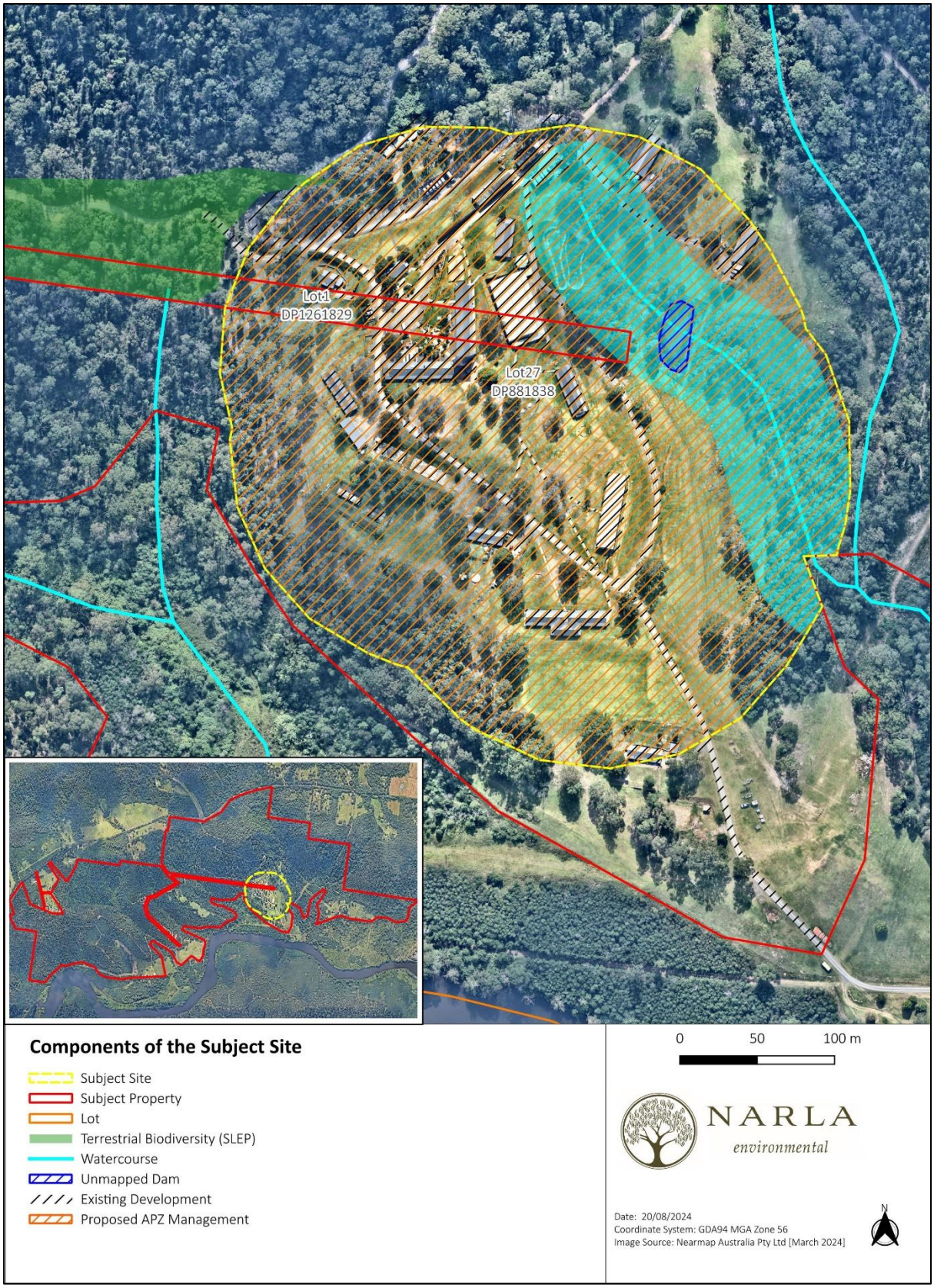


Figure 1. Components of the Subject Site.

1.7 Relevant Legislation and Policy

The legislation and policy that are addressed in this report are listed in **Table 1.**

Table 1. Relevant legislation and policy addressed.

Legislation/ Policy	Relevant Ecological Feature on Site	Triggered	Action Required
Environmental Planning and Assessment Act 1979 (EP&A Act)	All threatened species, populations and ecological communities and their habitat that occur or are likely to occur within the Subject Property during a part of their lifecycle.	Yes	Any future DA will require an ecological assessment and any other assessments relevant to the planning process under 'Part 4 Development assessment and consent'.
Biodiversity Conservation Act (BC Act) (New South Wales)	No BC Act listed Endangered Ecological Communities were identified within the Subject Site. No BC Act listed threatened species were identified within the site during the site assessment however, suitable habitat was identified.	Yes	Any future DA will need to be accompanied by a Flora and Fauna Assessment (FFA) including a Test of Significance on BC Act listed threatened ecological communities and species, or a Biodiversity Development Assessment Report (BDAR) with appropriate offsetting.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)	No EPBC Act listed Endangered Ecological Communities were identified within the Subject Site. No EPBC Act listed threatened species were identified within the site during the site assessment however, suitable habitat was identified.	Yes	An assessment of significance of impact from the proposed works on Matters of National Environmental Significance (MNES) EPBC Act Assessment of Significant Impact Criteria may be required if any threatened EPBC Act listed threatened ecological communities or species are impacted.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 4 Koala Habitat Protection 2021	This chapter of the SEPP applies to land within the Shoalhaven LGA and encompasses an area larger than 1ha.	Yes	An assessment addressing chapter 4 of the SEPP is to be included in any impact assessment submitted as part of a DA associated with the Subject Property. Efforts should be made to avoid impacts to native canopy species.
State Environmental Planning Policy (Resilience and Hazards) 2021 - Chapter 2 Coastal Management	The Subject Property does not contain areas mapped as 'Coastal Wetlands', 'Littoral Rainforest', or proximity to either, therefore, Chapter 2 of this SEPP does not apply.	No	None.

Legislation/ Policy	Relevant Ecological Feature on Site	Triggered	Action Required
Fisheries Management Act 1994 (FM Act)	The Subject Property does not contain areas mapped as Key Fish Habitat under the FM Act.	No	None.
Water Management Act 2000	Mapped watercourses were located within the Subject Property.	Yes	Any works conducted within 40m of a mapped watercourse may trigger the requirement for controlled activity approval from the Natural Resources Access Regulator (NRAR) in addition to DA.

1.8 Biodiversity Assessment Pathway

The requirements of the Biodiversity Conservation Act 2016 (BC Act) and Biodiversity Conservation Regulation 2017 are mandatory for all DAs assessed under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) submitted in the Shoalhaven Local Government Area (LGA).

The BC Act and its regulations stipulate clearing 'area threshold' values (**Table 2**) that determine whether a development must be assessed under the Biodiversity Offset Scheme (BOS). Minimum entry thresholds for vegetation clearing depend on the minimum lot size (shown in the Lot Size Maps under the relevant Local Environmental Plan [LEP]) or the actual lot size (where no minimum lot size is provided for the relevant land under the LEP).

The Subject Property has a minimum lot size of 40 ha. To avoid triggering the BOS, the proponent must limit the clearing or management of native vegetation to no more than 1 hectare per DA.

In addition to the clearing 'area threshold,' the Biodiversity Values (BV) Map (DPE 2024) identifies land with high biodiversity values that are particularly sensitive to impacts from development and clearing. This map is another trigger for determining whether the BOS applies to a clearing or development proposal. It has been prepared by the Department of Planning and Environment (DPE) under Part 7 of the BC Act.

The Subject Property contains areas identified on the BV Map. Any impact on native vegetation within these mapped areas will necessitate a BDAR and entry into the BOS. A recent review (**Figure 2, Figure 3**) has resulted in the removal of BV mapping that was previously present within the Subject Site.

Table 2. Biodiversity Offset Scheme entry thresholds.

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	0.25 ha or more
1 ha to less than 40 ha	0.50 ha or more
40 ha to less than 1000 ha	**1 ha or more**
1000 ha or more	2 ha or more

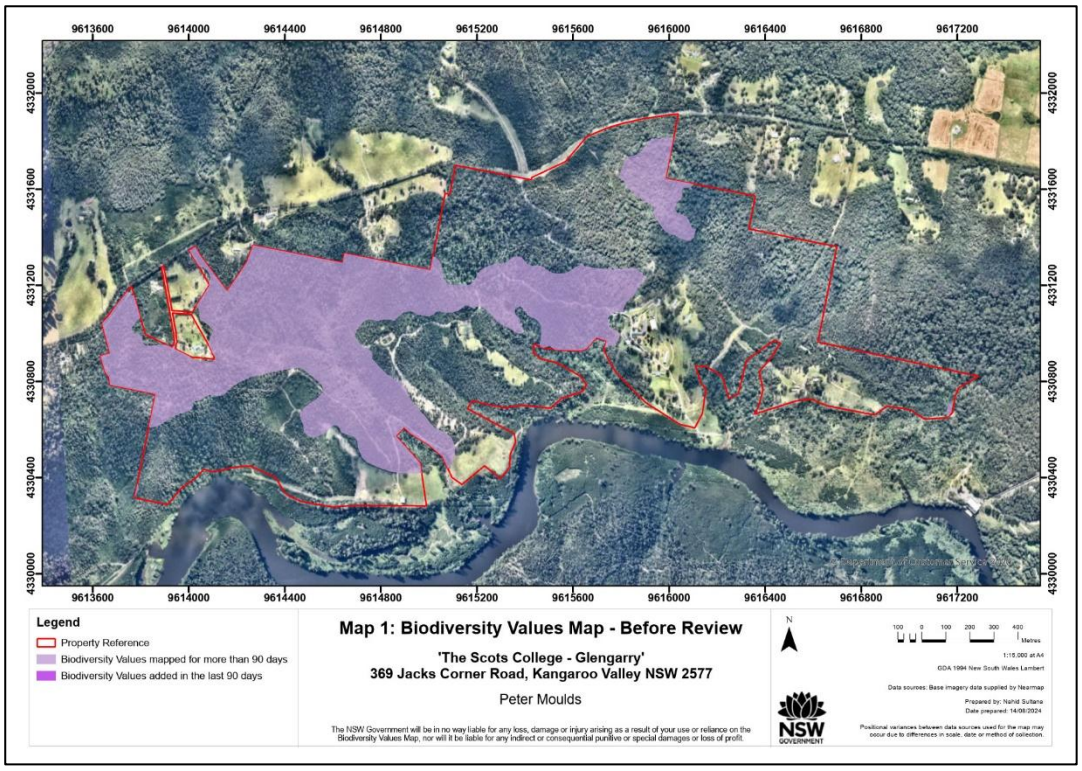


Figure 2. Biodiversity Values Mapping before the 2024 review.

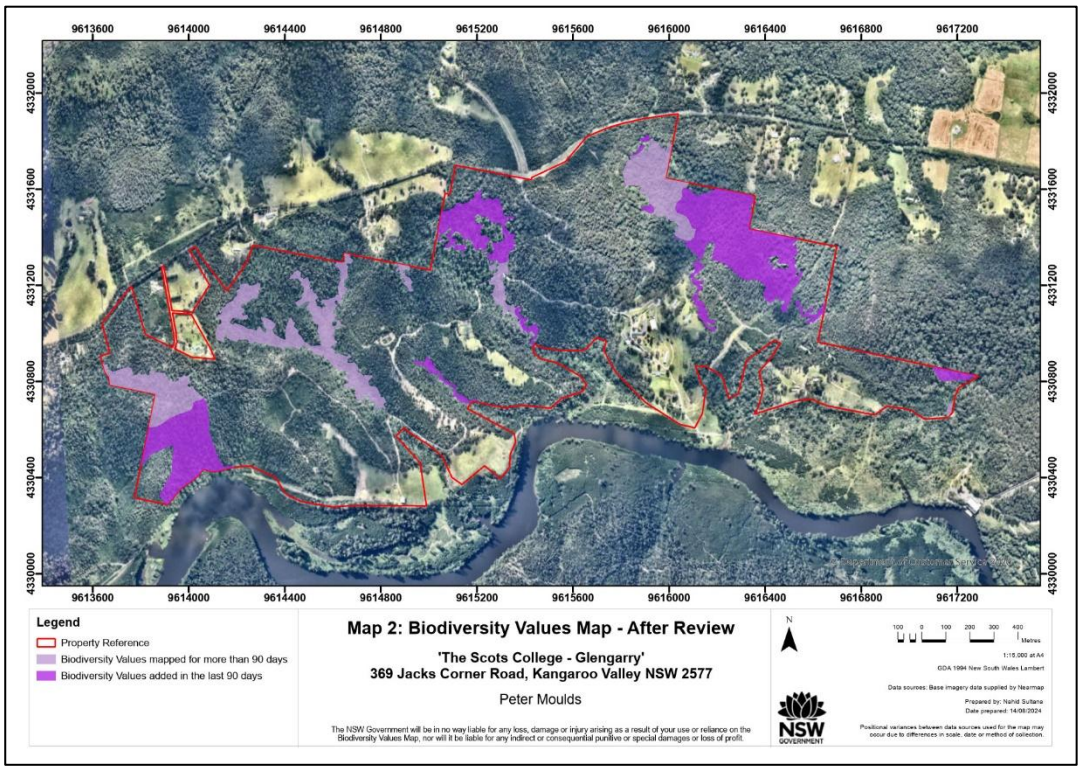


Figure 3. Biodiversity Values Mapping after the 2024 review.

1.9 Shoalhaven Local Environmental Plan 2014 (SLEP)

1.9.1 Zoning

The Subject Site contains land zoned as 'C3: Environmental Management', 'C2: Environmental Conservation'.

The SLEP requires that the development satisfies the zone objectives which are as follows:

- C3: Environmental Management
    - To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values;
    - To provide for a limited range of development that does not have an adverse effect on those values;
    - To protect the natural and cultural features of the landscape, including coastal and foreshore areas, that contribute to scenic value and visual amenity; and
    - To maintain the stability of coastal land forms and protect the water quality and ecological values of estuaries and coastal streams.
- C2: Environmental Conservation:
    - To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.
    - To prevent development that could destroy, damage or otherwise have an adverse effect on those values.
    - To protect water quality and the ecological integrity of water supply catchments and other catchments and natural waterways.
    - To protect the scenic, ecological, educational and recreational values of wetlands, rainforests, escarpment areas and fauna habitat linkages.
    - To conserve and, where appropriate, restore natural vegetation in order to protect the erosion and slippage of steep slopes.

1.9.2 Terrestrial Biodiversity - habitat corridor

The Subject Site marginally contains areas mapped as "Terrestrial Biodiversity—significant vegetation."

The objectives of this mapping as per the SLEP are to:

- Protect native fauna and flora,
- Protect the ecological processes necessary for their continued existence, and
- Encourage the conservation and recovery of native fauna and flora and their habitats.

This clause applies to land—

- Identified as "Biodiversity—habitat corridor" or "Biodiversity—significant vegetation" on the SLEP Terrestrial Biodiversity Map, and
- Situated within 40m of the bank (measured horizontally from the top of the bank) of a natural waterbody.

Before determining a DA for development on land to which this clause applies, the consent authority must consider:

- Whether the development is likely to have—
    - Any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and
    - Any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and

- Any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and
- Any adverse impact on the habitat elements providing connectivity on the land, and

- Any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that—

- The development is designed, sited and will be managed to avoid any significant adverse environmental impact, or
- If that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or
- If that impact cannot be minimised—the development will be managed to mitigate that impact

1.10 State Environmental Planning Policy (Biodiversity and Conservation) 2021- Chapter 4 Koala Habitat Protection 2021

This Chapter aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. As the Shoalhaven LGA is included in Schedule 2 of State Environmental Planning Policy (Koala Habitat Protection) 2021, this SEPP applies to the Subject Property.

This section applies to land to which this Chapter applies if the land:

- Has an area of at least 1 hectare (including adjoining land within the same ownership); and
- Does not have an approved koala plan of management applying to the land.

Before a council may grant consent to a DA for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on koalas or koala habitat. If the council is satisfied that the development is likely to have low or no impact on koalas or koala habitat, the council may grant consent to the DA.

A site assessment was undertaken to determine whether the land contained core koala habitat, which is defined by the SEPP as:

- an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or
- an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

The Subject Property contains suitable habitat for koalas, where 15% or more of the total number of trees are species listed in Schedule 2 of the SEPP. Signs of koalas or koala occupancy (scratch marks) were observed within the Subject Site, and there are historical records of koalas within the Subject Property (**Plate 1, Figure 4**). Consequently, any ecological assessment submitted as part of a DA for the Subject Property must include an assessment addressing Chapter 4 of the SEPP.

Plate 1. Scratch marks observed during the site assessment.

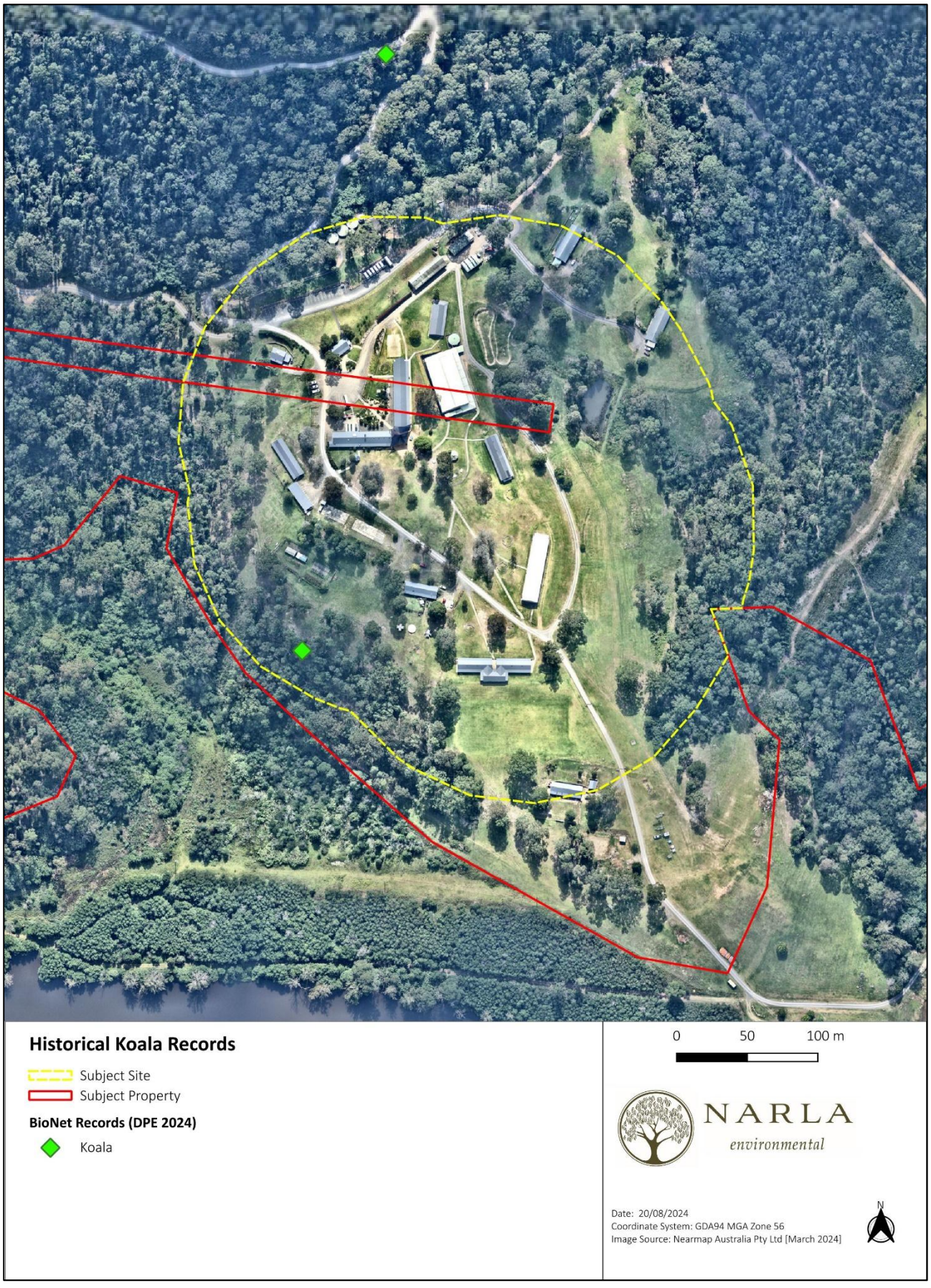


Figure 4. Historical koala records within the Subject Property.

2. Methodology

2.1 Desktop Assessment and Literature Review

A thorough literature review of local information relevant to the Shoalhaven LGA was undertaken. Searches using NSW Wildlife Atlas (BioNet; DPE 2024b) and the Commonwealth Protected Matters Search Tool (DCCEEW 2024) were conducted to identify all current threatened flora and fauna, as well as migratory fauna records within a 10km x 10km cell search area centred on the Subject Property. This data was used to assist in establishing the presence or likelihood of any ecological values as occurring on or adjacent to the Subject Property and helped inform our Ecologists on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment on the Subject Property and to assist in determining whether any threatened flora or ecological communities may occur there.

2.2 Ecological Site Assessment

2.2.1 General Survey

A site assessment was undertaken by Narla Ecologists, Brodie Miller and Allirah Wallace on the 23rd May 2024. During the site assessments, the following activities were undertaken:

- Identifying and recording the vegetation communities present on the Subject Property, with a focus on identifying any Threatened Ecological Communities (TEC);
- Recording a detailed list of flora species encountered on the Subject Property, with a focus on threatened species, species diagnostic of TECs and Priority Weeds;
- Recording opportunistic sightings of any fauna species seen or heard on or within the immediate surrounds of the Subject Property;
- Identifying and recording the locations of notable fauna habitat such as important nesting, roosting or foraging microhabitats;
- Assessing the connectivity and quality of the vegetation within the Subject Property and surrounding area;
- Any other habitat features that may support fauna (particularly threatened) species; and
- Targeting the habitat of any threatened and regionally significant fauna including:
    - Tree hollows (habitat for threatened large forest owls, parrots, cockatoos and arboreal mammals);
    - Caves and crevices (habitat for threatened reptiles, small mammals and microbats);
    - Termite mounds (habitat for threatened reptiles);
    - Soaks (habitat for threatened frogs);
    - Wetlands (habitat for threatened fish, frogs and water birds);
    - Drainage lines (habitat for threatened fish and frogs);
    - Fruiting trees (food for threatened frugivorous birds and mammals);
    - Flowering trees (food for threatened nectivorous mammals and birds);
    - Trees and shrubs supporting nest structures (habitat for threatened birds and arboreal mammals);
    - Logs, bark and artificial debris (habitat for threatened frogs, reptiles and snails.

2.2.2 Weather Conditions

Weather conditions recorded at the nearest weather stations (Moss Vale AWS) prior to and during the general flora and fauna survey period are provided in **Table 3** (BOM 2024). The data reveals cool to moderate temperatures and minor rainfall leading up to the survey. These weather conditions are unlikely to have been conducive to the emergence of annual herbs or threatened species.

Table 3. Weather conditions recorded at Moss Vale AWS (station 068239) preceding and during the site assessments (site assessment dates in bold).

Survey date	Minimum Temp. (°C)	Maximum Temp. (°C)	Rainfall (mm)
16/05/2024	3.6	16.5	0.2
17/05/2024	4	18	0.2
18/05/2024	5.3	9.6	0
19/05/2024	0.4	12.2	0
20/05/2024	0.8	12.8	0
21/05/2024	4.7	13.3	0
22/05/2024	-1	12.6	0
23/05/2024	**-1.7**	**16.3**	**0.2**

2.2.3 Mapping and Analysis of Vegetation Communities

Narla examined local satellite imagery, geological mapping, soil landscape mapping and topographic mapping, in addition to existing vegetation mapping in order to stratify the Subject Property and guide the site assessment survey efforts. The following documents were consulted during assessment to assist with the identification of vegetation communities present within the Subject Property:

- eSPADE v2.2 (DPE 2024d);
- DPE (2022) NSW State Vegetation Type Map; and
- Department of Regional NSW Minview (2024).

3. Native Vegetation

3.1 Historically Mapped Vegetation Communities

The NSW State Vegetation Map (DPE 2022) identifies four (4) plant communities within the Subject Site in addition to non-classified vegetation (**Figure 5**):

- Nattai-Morton Sandstone Peppermint Gully Forest
- Shoalhaven Foothills Bloodwood Heathy Forest
- Shoalhaven Foothills Spotted Gum Forest
- Shoalhaven Lowland Bloodwood Shrub Forest

3.2 Field Validated Vegetation Communities

The site assessment revealed three (3) vegetation zones within the Subject Site (**Figure 6**):

- Shoalhaven Foothills Spotted Gum Forest
- Nattai-Morton Sandstone Peppermint Gully Forest
- Exotic Dominated Vegetation

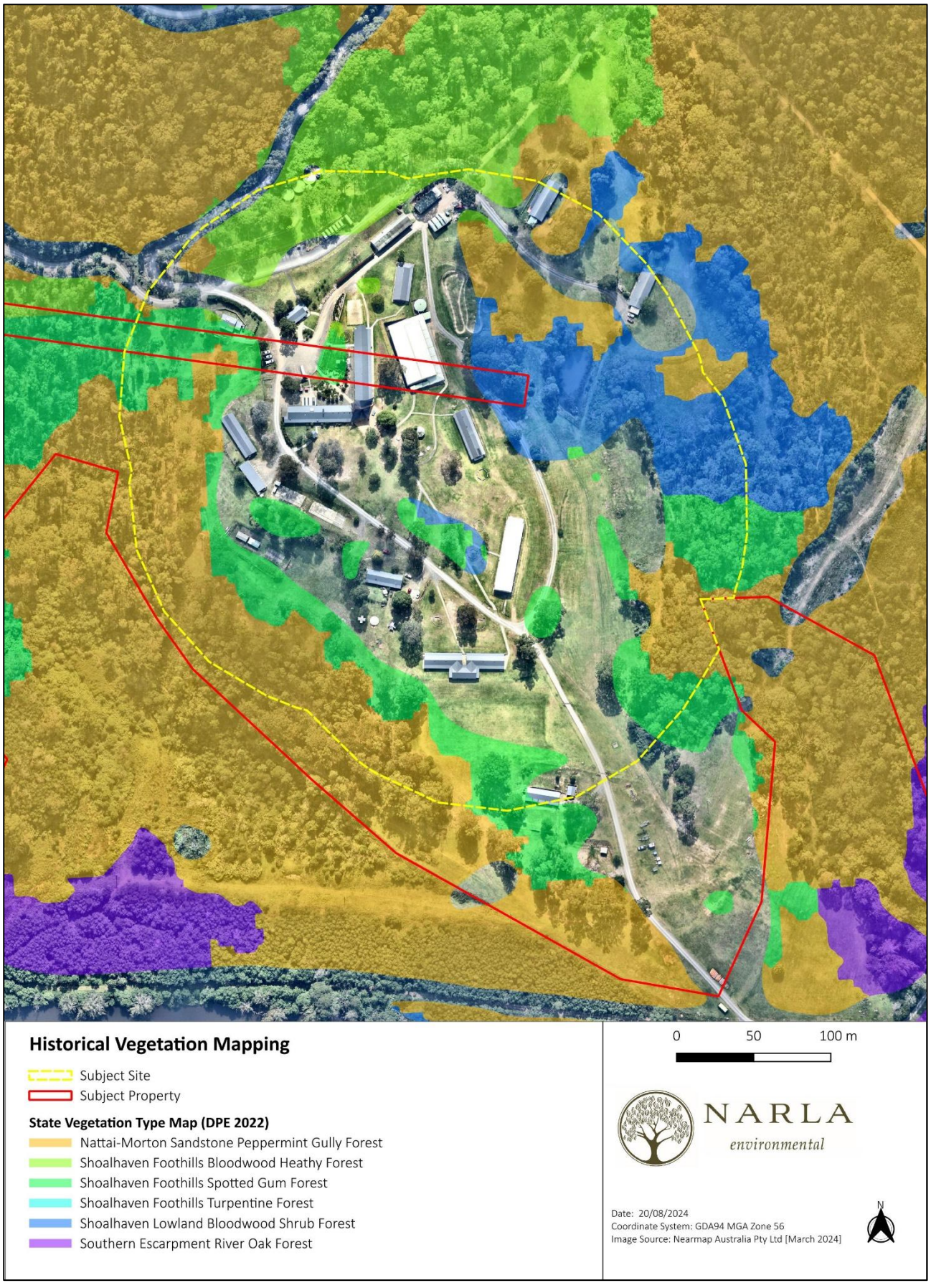


Figure 5. Historically mapped vegetation communities within and surrounding the Subject Site.

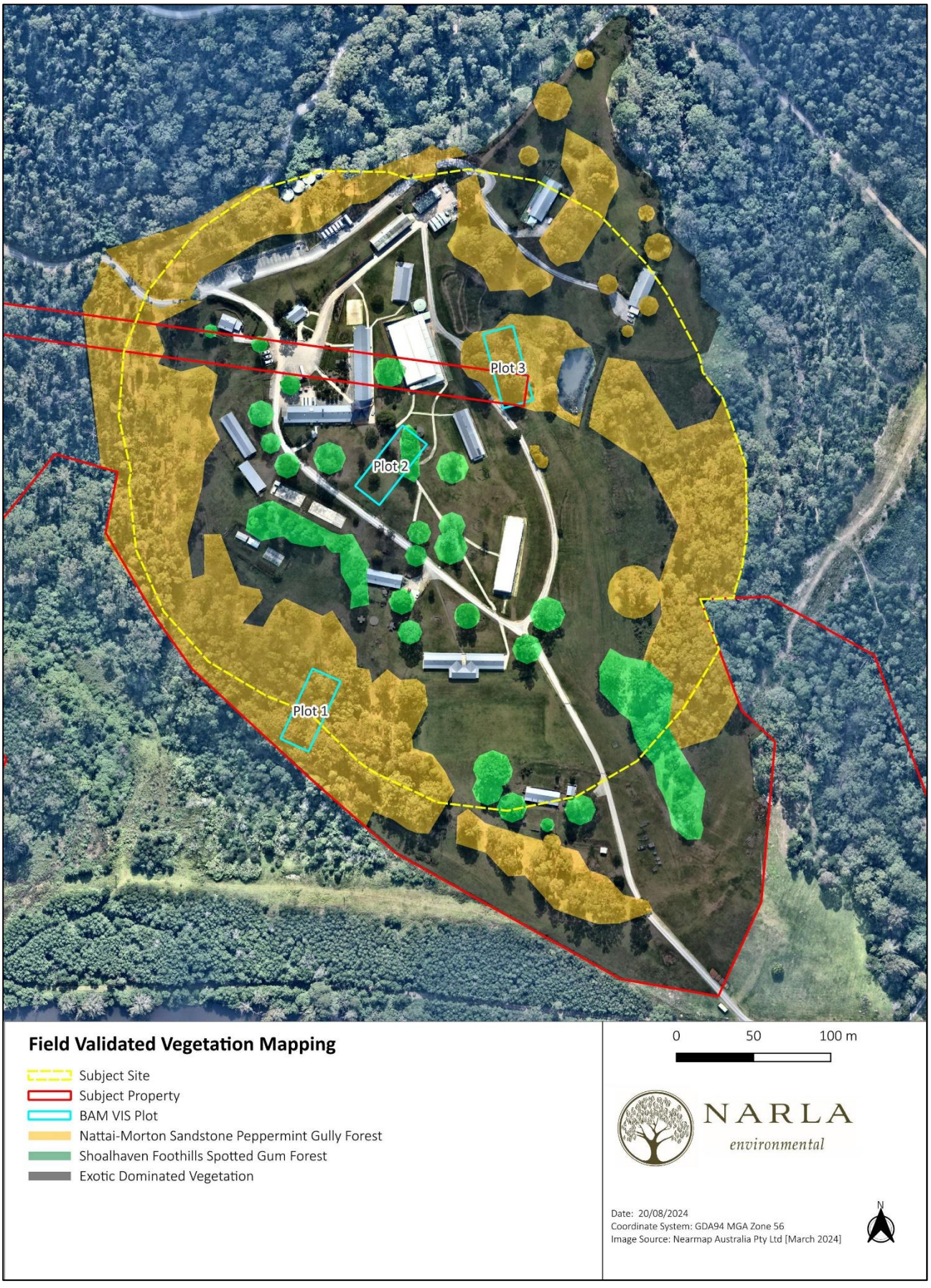


Figure 6.Narla Field-validated Vegetation Zones within the Subject Site.

Table 4. Description of Nattai-Morton Sandstone Peppermint Gully Forest within the Subject Site.

Nattai-Morton Sandstone Peppermint Gully Forest

Description from VIS (DPE 2024b)
A tall to very tall sclerophyll open forest with a sparse dry shrub layer and ferny ground layer found in elevated sandstone gullies and sheltered slopes of the Southern Highlands and Shoalhaven ranges. The tree canopy is almost always dominated by *Eucalyptus piperita*, rarely with *Syncarpia glomulifera*, *Corymbia gummifera* or tall cool climate eucalypt species such as *Eucalyptus smithii*, *Eucalyptus elata* or *Eucalyptus cypellocarpa*. The mid-stratum is layered with a sparse cover of small trees that almost always includes *Elaeocarpus reticulatus* and occasionally or rarely, taller Acacia species such as *Acacia irrorata*. A sparse lower layer of dry shrubs very frequently includes *Leucopogon lanceolatus* and *Persoonia linearis*. The ground layer is characterised by a high cover of ferns that almost always includes *Pteridium esculentum*, very frequently with *Calochlaena dubia* and *Blechnum cartilagineum*. Small climbers are diverse, and very frequently include *Tylophora barbata* and *Eustrephus latifolius*, and commonly *Clematis aristata*. This PCT occurs on both Triassic and Permian quartz-rich sandstones, with the former occurring in the southern Nattai and Woronora plateaus, in areas of generally above 400 metres asl. East of the Southern Highlands and onto the Morton plateau it is more commonly associated with Shoalhaven Group sandstones and falls to near 100 metres asl at the lowest recorded plot. In wetter environments on the escarpment edge, it is replaced by fern forest PCT 3589, and in drier and lower elevations, it is replaced by dry shrub forest PCT 3612. This community grades into tall wet forest PCT 3187 in gullies of the Shoalhaven ranges.

Nattai-Morton Sandstone Peppermint Gully Forest	
Vegetation Description	The canopy in the areas mapped as Nattai-Morton Sandstone Peppermint Gully Forest includes species such as *Angophora floribunda, Corymbia gummifera, Eucalyptus piperita,* and *Eucalyptus punctata*. The mid-story comprises native species like *Acacia longifolia, Acacia maidenii, Acacia terminalis, Acacia ulicifolia, Banksia spinulosa, Breynia oblongifolia, Lissanthe strigosa,* and *Pittosporum undulatum*. Exotic species such as *Solanum mauritianum* and *Ligustrum sinense* are also present. The ground layer, characterized by high litter cover, includes native species such as *Cayratia clematidea, Commelina cyanea, Entolasia marginata, Lomandra multiflora*, and *Pteridium esculentum*, as well as exotic species like *Ageratina adenophora, Bidens subalternans, Sporobolus fertilis*, and *Senecio madagascariensis*.
Justification of Vegetation Community	The determination of this community was based on the IBRA Bioregion, IBRA Sub-region, landscape attributes including soil landscapes and elevation, and the presence, cover and frequency of several diagnostic species.
BC Act Status	N/A
EPBC Act Status	N/A

Table 5. Description of Shoalhaven Foothills Spotted Gum Forest within the Subject Site.

Shoalhaven Foothills Spotted Gum Forest	
	
Description from VIS (DPE 2024b)	
A restricted tall to very tall dry shrubby sclerophyll open forest with a sparse grassy ground layer found on steep slopes of the lower Shoalhaven gorge and surrounding tributaries. The tree canopy very frequently includes a high cover of both *Corymbia maculata* and *Eucalyptus fibrosa*, with a less frequent and sparse cover of *Corymbia gummifera* and *Eucalyptus punctata*. Other common species are stringybarks (*Eucalyptus sparsifolia*, *Eucalyptus agglomerata*, *Eucalyptus eugenioides*), however individual species are rare. The mid-stratum is a sparse cover of dry shrubs with *Persoonia linearis* almost always present, very frequently with *Daviesia ulicifolia* and commonly *Dillwynia sieberi*, *Hakea sericea*, *Acacia ulicifolia*, and *Jacksonia scoparia*. The ground layer is also generally sparse, however almost always includes a few individuals of *Macrozamia communis*. Other life forms such as grasses are very frequent and relatively diverse with *Panicum simile*, *Entolasia stricta*, *Aristida vagans*, and *Themeda triandra* all recorded in over half of the plots. The graminoids *Dianella revoluta* and *Lepidosperma laterale* are also very frequent. An interesting feature of this PCT is the moderately strong floristic similarity to the dry shrub grass forest PCT 3444 dominated by *Corymbia maculata* found in the lower Hunter valley almost 250 km to the north. PCT 3444 also occurs on Permian aged sediments within similar elevation ranges however includes some species that are endemic to the Hunter region. In the Shoalhaven PCT 3447 occurs in rugged rather than low-lying relief landscapes and is strongly associated with the sandstones of the Snapper Point Formation or Nowra sandstone on crests, exposed and semi-sheltered slopes.	
Vegetation Description	The areas mapped as Shoalhaven Foothills Spotted Gum Forest exhibit evidence of extensive management. Canopy species in these areas include *Corymbia maculata*,

Shoalhaven Foothills Spotted Gum Forest	
	Eucalyptus botryoides, *Eucalyptus cinerea*, *Eucalyptus piperita*, and *Eucalyptus punctata*. The mid-story is very limited, with some occurrences of *Acacia* species and *Pittosporum undulatum*. The ground layer includes native species such as *Commelina cyanea*, *Microlaena stipoides*, *Dichondra repens*, *Echinopogon ovatus*, and *Eragrostis leptostachya*, interspersed with exotics such as *Axonopus* species and *Digitaria sanguinalis* among others.
Justification of Vegetation Community	The determination of this community was based on the IBRA Bioregion, IBRA Sub-region, landscape attributes including soil landscapes and elevation, and the presence, cover and frequency several diagnostic species.
BC Act Status	N/A
EPBC Act Status	N/A

Table 6. Description of Exotic Dominated Vegetation within the Subject Site.

Exotic Dominated Vegetation	
	
Vegetation Description	The areas mapped as Exotic Dominated Vegetation are characterized by exotic trees, lawns, and garden beds. Canopy species include *Jacaranda* spp. and *Pinus* spp. among others. The mid-story includes but is not limited to *Buxus* spp., *Ligustrum sinense*, and *Corymbia ficifolia*. The ground layer features *Dietes* spp., *Axonopus* spp., *Geranium* spp., *Richea* spp., and *Digitaria sanguinalis* among others.
Justification of Vegetation Community	The species observed within these areas do not clearly match any PCT known to the IBRA Region and Subregion. As such, it has been allocated Exotic Dominated Vegetation.
BC Act Status	N/A
EPBC Act Status	N/A

4. Threatened Species

4.1 Threatened Flora

Desktop analysis revealed a range of threatened flora as occurring or having the potential to occur on or within a 100km² search area centred on the Subject Property. Opportunistic surveys were conducted within the Subject Property for all species whose approved survey period (DPE 2024b) coincided with the May site assessment.

No threatened flora were identified during the opportunistic surveys conducted as part of the site assessment, however more thorough targeted surveys of any future impact area would be required to fully rule out their presence. The flora species identified by the Narla Ecologists during the site assessment is provided in **Appendix A**.

4.2 Threatened Fauna

No threatened fauna were identified during the opportunistic surveys conducted as part of the site assessment, however more thorough targeted surveys of any future impact area would be required to fully rule out their presence. The fauna species identified by the Narla Ecologists during the site assessment is provided in **Appendix B.**

4.2.1 Threatened Fauna Habitat

Native fauna species were identified within and surrounding the Subject Area during the site assessment. All fauna species encountered are presented in **Appendix B.** Details of the fauna habitat recorded in the Subject Property are included in **Table 7**.

Table 7. Fauna habitat values identified within the Subject Site.

Habitat component	Site values
Coarse woody debris	Coarse woody debris material occurred sporadically throughout the Subject Site. This may provide habitat for threatened reptiles and small threatened mammal species.
Rock outcrops and bush rock	Present. Bush rock was present within the Subject Site.
Caves, crevices and overhangs	Absent
Culverts, bridges, mine shafts, or abandoned structures	Absent.
Nectar/lerp-bearing Trees	Many nectar-bearing Eucalypts were recorded within the Subject Site. These trees may provide intermittent nectar and/or lerp sources for nomadic nectivores such as Grey-headed Flying-fox.
Nectar-bearing shrubs	Nectar bearing shrubs occurred sporadically throughout the Subject Site. These shrubs may provide intermittent nectar and/or lerp sources for similar nectivores.
Koala Feed Trees	Koala feed tree species were identified within the Subject Site.
Nests	No stick nests were observed within the Subject Site.

Habitat component	Site values
Sap and gum sources	Native sap and gum source trees were recorded within the Subject Site given the canopy of *Eucalyptus spp.*
She-oak fruit (Glossy Black Cockatoo feed)	Absent.
Seed-bearing trees and shrubs	Seed-bearing trees such as the Eucalypt species identified within the Subject Site may provide foraging habitat for threatened species.
Soft-fruit-bearing trees	Soft-fruit-bearing shrubs such as *Pittosporum undulatum* were identified within the Subject Site and may provide foraging habitat for threatened species.
Dense shrubbery and leaf litter	Present.
Tree hollows	Multiple hollows and nest boxes were present across the Subject Site which may provide breeding habitat for a number of threatened bird or mammal species (**Figure 7**).
Decorticating bark	Absent.
Wetlands, soaks and streams	Present. One mapped 1st order watercourse and one (1) unmapped dam is located along the southeastern extent of the Subject Site.
Open water bodies	Absent.
Estuarine, beach, mudflats, and rocky foreshores	Absent.

4.3 Migratory Fauna Species

The following EPBC Act listed migratory fauna species were considered to potentially utilise habitat within or around the Subject Property for foraging or passage:

- *Actitis hypoleucos* (Common Sandpiper)
- *Apus pacificus* (Fork-tailed Swift)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris melanotos* (Pectoral Sandpiper)
- *Cuculus optatus* (Oriental Cuckoo, Horsfield's Cuckoo)
- *Gallinago hardwickii* (Latham's Snipe, Japanese Snipe)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Monarcha melanopsis* (Black-faced Monarch)
- *Motacilla flava* (Yellow Wagtail)
- *Myiagra cyanoleuca* (Satin Flycatcher)
- *Numenius madagascariensis* (Eastern Curlew, Far Eastern Curlew)
- *Pandion haliaetus* (Osprey)
- *Rhipidura rufifrons* (Rufous Fantail)
- *Symposiachrus trivirgatus* (Spectacled Monarch)
- *Tringa nebularia* (Common Greenshank, Greenshank)

It is deemed that any potential occurrence of these species would be purely sporadic fly-ins. It is not deemed likely that future development within the Subject Property would result in a significant impact to any of these species.

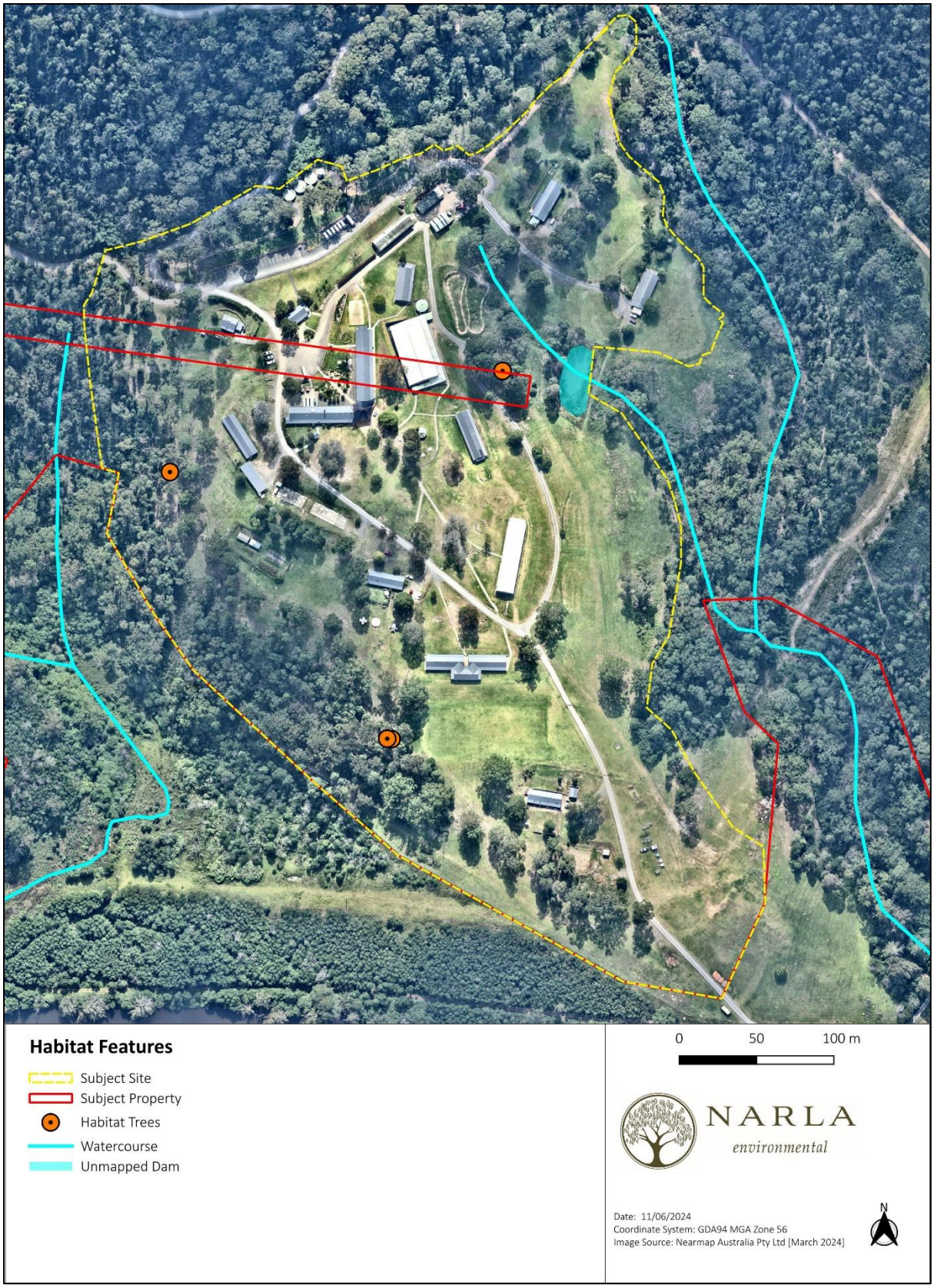


Figure 7. Habitat Features identified within the Subject Site.

5. Recommendations

5.1 Avoidance of Impacts

5.1.1 Habitat Trees

Numerous hollow bearing trees and nest boxes are present within the Subject Site. Any future development should aim to retain these trees given the potential habitat they provide to threatened fauna. Any hollows that require removal as a result of future works should be done so under the supervision of an ecologist and replaced with artificial nest boxes elsewhere within the Subject Property.

5.1.2 Watercourses

One watercourse is historically mapped and were identified within the Subject Site (**Figure 1**). Future works should aim to minimize impacts to this feature as much as possible. Any works conducted within 40m of these features may require controlled activity approval from the NRAR.

5.2 Biodiversity Offset Scheme

5.2.1 Clearing Threshold and Potential Offset Obligations

Should clearing or vegetation management (for bushfire protection) for any future development exceed 1ha, offsetting will be required through the retiring of ecosystem and species credits under the BOS. A BDAR will also be required to assess these impacts.

5.2.2 Ecosystem Credits

Vegetation Integrity (VI) plots were conducted within the Subject Property to provide the proponent with an indication of the condition of the vegetation present and to provide an estimate of the potential credit obligations associated with the proposed additional APZ management. The data collected for the vegetation plots was then entered into the BAM Calculator for the associated impacts area to provide an indication of the potential credits that may be required to be offset by future development.

5.2.2.1 Nattai-Morton Sandstone Peppermint Gully Forest

Should a BDAR be required, the pricing of ecosystem credits to offset impacts to Nattai-Morton Sandstone Peppermint Gully Forest are as follows:

- These credits were last known to be worth approximately $8,400.00 /credit (excl GST; as of January 2024).
- Credit prices are now only available through obtaining a quote from the BCT upon receiving DA consent. Therefore, the prices provided above may no longer be accurate and should be used as a guide only.

5.2.3 Species Credits

Should a BDAR be required, the payment calculator also identifies species that are known to be associated with the PCT identified within a property. As such it is likely any future impact will also require the purchase and

retirement of species credits through the BOS. The species that will need to be offset or surveyed for is dependent on the scale of the future impact. As a guide, the species that may require surveying or offsetting for include:

- *Chalinolobus dwyeri* (Large-eared Pied Bat);
- *Mixophyes balbus* (Stuttering Frog);
- *Petrogale penicillata* (Brush-tailed Rock-wallaby);
- *Rhizanthella slateri* (Eastern Australian Underground Orchid).

6. Biodiversity Constraints Mapping

Narla has mapped the Subject Property into three (3) levels of 'Biodiversity Development Constraints' (**Figure 8**). The interpretation of each zone is detailed in **Table 8**.

This map was produced using information gathered from both desktop assessment of existing/historical mapping and data obtained from fieldwork undertaken by the Narla Ecologists. It is to be used as a guide only and a strong degree of caution must be expressed when interpreting it.

Table 8. Biodiversity constraints mapping key.

Zone	Description
Low Constraints Area – Green	This zone is deemed to have the highest potential for future DA Approval with the accompaniment of the appropriate environmental assessments and implementation of appropriate restrictions and guidelines. This zone encompasses: ▪ Areas mapped as Exotic Dominated Vegetation; ▪ Areas with existing development.
Moderate Constraints Area- Orange	This zone is deemed to have a moderate potential for future development with accompaniment of the appropriate environmental assessments and implementation of appropriate restrictions and guidelines. This zone encompasses: ▪ Areas mapped as Shoalhaven Foothills Spotted Gum Forest and Nattai-Morton Sandstone Peppermint Gully Forest ▪ Areas mapped as Terrestrial Biodiversity under the SLEP. ▪ Areas proposed as requiring additional APZ management **as long as the total required clearing is less than 1ha.**
High Constraints Area- Red	This zone is deemed to have a low potential for future development without intensive ecological assessment and/or cost. Any impacts proposed in this area should be kept as small as possible. This zone encompasses: ▪ A 15m buffer applied around hollows/nest boxes. ▪ A 40m buffer around watercourses with native vegetation intersecting the Subject Site;

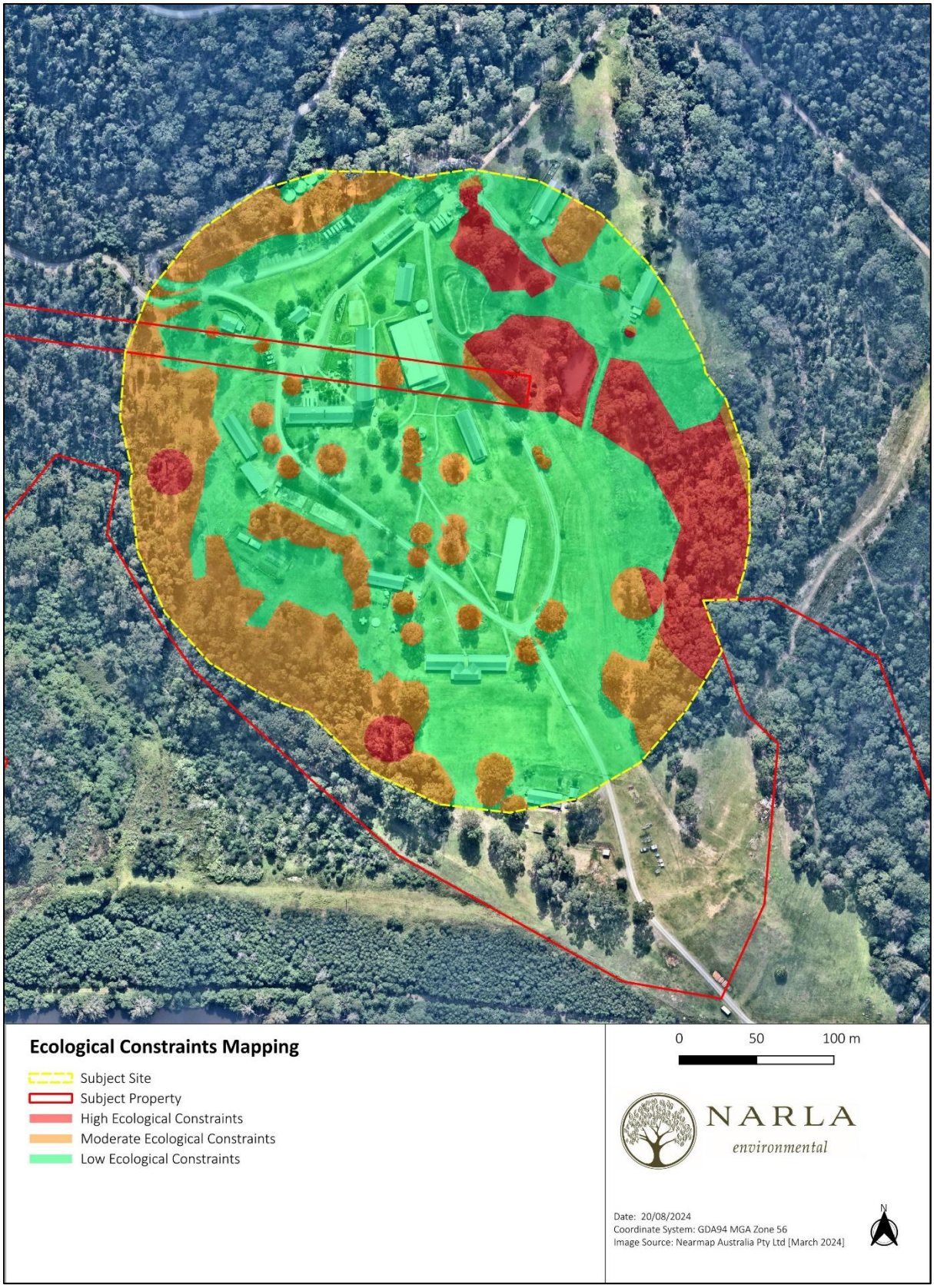


Figure 8. Biodiversity development constraints mapped within the Subject Site.

7. Conclusion

The ECA for the 369 Jacks Corner Road, Kangaroo Valley conducted by Narla Environmental provides an analysis of the site's ecological values, constraints, and potential impacts associated with the proposed Masterplan for the Scots College, Glengarry Campus.

The site comprises three primary vegetation zones: Shoalhaven Foothills Spotted Gum Forest, Nattai-Morton Sandstone Peppermint Gully Forest, and Exotic Dominated Vegetation. These communities were identified and validated through field surveys and desktop assessments.

No threatened flora or fauna species were identified during the site surveys; however, the presence of suitable habitats suggests potential for such species. More comprehensive targeted surveys will be required for future impact areas to fully rule out their presence.

The site contains habitats that support various fauna species, including hollows, nectar-bearing trees, and watercourses.

The assessment highlights areas with varying levels of biodiversity constraints, categorized into low, moderate, and high constraint zones. These zones guide future development to minimize ecological impacts.

Should clearing works exceed 1 hectare, entry in the Biodiversity Offset Scheme following the preparation of a BDAR will be required.

8. References

Baxter and Jacobson Architects (2024) Masterplan for Scots College Glengarry Campus

Building Code & Bushfire Hazard Solutions (2024) Bushfire Assessment Report Proposed Alterations and Additions at Scots College, Glengarry Campus, Kangaroo Valley

Bureau of Meteorology (BOM) (2024) Moss Vale AWS May 2024 Daily Weather Observations

Department of Climate Change, Energy, The Environment and Water (2024) Protected Matters Search Tool, http://www.environment.gov.au/epbc/pmst/

Department of Planning and Environment (DPE) (2022) NSW State Vegetation Map

Department of Planning and Environment (DPE) (2024a) Biodiversity Values Map and Threshold Tool

Department of Planning and Environment (DPE) (2024d) eSPADE v2.2 https://www.environment.nsw.gov.au/eSpade2Webapp#

Department of Planning, Industry and Environment (DPE) (2024b) BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

Department of Planning, Industry and Environment (DPE) (2024c) BioNet Vegetation Classification. https://www.environment.nsw.gov.au/research/Visclassification.htm

Department of Planning, Industry and Environment (DPIE) (2020) Surveying Threatened Plants and Their Habitats

Department of Regional NSW Minview (2024) https://minview.geoscience.nsw.gov.au

NSW Government Spatial Services (SIX Maps) (2024) NSW Government Land & Property Information Spatial Information Exchange map viewer, https://six.nsw.gov.au/

PlantNET (2024) The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au

Shoalhaven Council (2014) Development Control Plan

Shoalhaven Council (2014) Local Environment Plan

9. Appendices

Appendix A. Flora species identified within the Subject Property.

Appendix B. Fauna species identified within and surrounding the Subject Property.

Appendix C. The Scots College Glengarry Campus Masterplan (Baxter Jacobson Architects 2024).

Appendix D. Proposed Additional APZ Management (Bushfire Hazard Solutions, 2024).

Appendix A. Flora species identified within the Subject Property.

Scientific Name	Canopy	Mid-storey	Groundcover
Acacia binervata		x	
Acacia longifolia		x	
Acacia maidenii		x	
Acacia terminalis		x	
Acacia ulicifolia		x	
*Ageratina adenophora**			x
Angophora floribunda	x		
*Araujia sericifera**			x
*Axonopus spp.**			x
Banksia spinulosa		x	
*Bidens pilosa**			x
*Bidens subalternans**			x
Billardiera scandens			x
Breynia oblongifolia		x	
*Buxus spp.**		x	
Cayratia clematidea			x
Cissus antarctica			x
Commelina cyanea			x
*Conyza spp.**			x
*Corymbia ficifolia**		x	
Corymbia gummifera	x		
Corymbia maculata	x		
Cymbopogon refractus			x
Cynodon dactylon			x
Desmodium spp.			x
Dianella longifolia			x
Dichondra repens			x
*Dietes spp.**			x
*Digitaria sanguinalis**			x
Echinopogon ovatus			x
Entolasia marginata			x
Eragrostis leptostachya			x
Eucalyptus amplifolia	x		
Eucalyptus botryoides	x		
Eucalyptus cinerea	x		

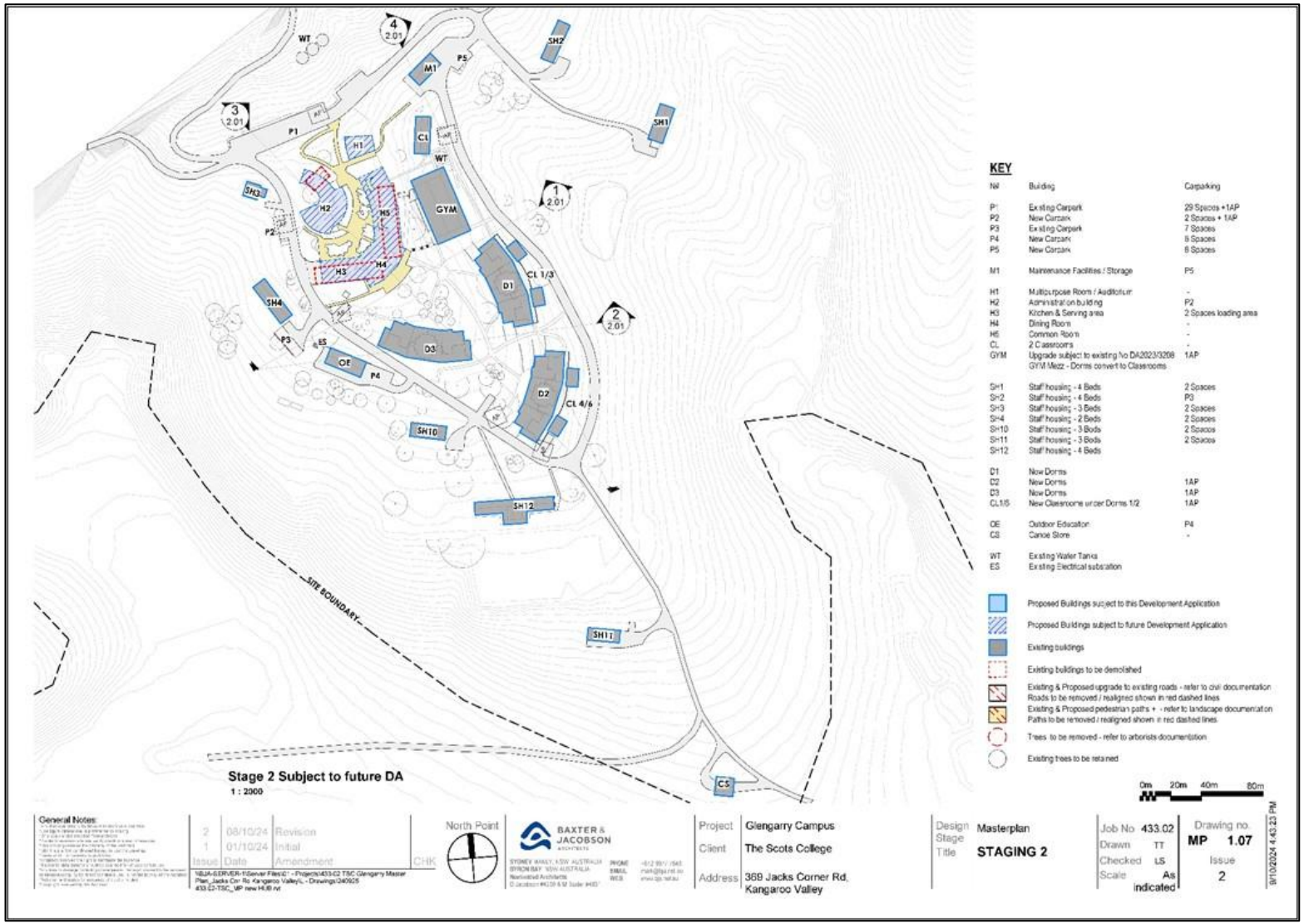
Scientific Name	Canopy	Mid-storey	Groundcover
Eucalyptus piperita	x		
Eucalyptus punctata	x		
Eustrephus latifolius			x
Geranium spp.			x
Glycine spp.			x
Grevillea robusta	x		
Hardenbergia violacea			x
Hydrocotyle spp.			x
*Hypochaeris spp.**			x
Hypolepis spp.			x
*Iris spp.**			x
*Jacaranda spp.**	x		
*Ligustrum sinense**		x	
Lissanthe strigosa		x	
Lobelia purpurascens			x
Lomandra longifolia			x
Lomandra multiflora			x
Microlaena stipoides			x
Oplismenus spp.			x
Persoonia linearis		x	
*Pinus spp.**	x		
Pittosporum undulatum		x	
Plectranthus parviflorus			x
Podolobium ilicifolium			x
*Richea spp.**			x
*Senecio madagascariensis***			x
*Sida rhombifolia**			x
Sigesbeckia orientalis			x
*Solanum mauritianum**		x	
*Sporobolus fertilis**			x
Trema tomentosum		x	
Xerochrysum spp.			x

** Denotes exotic species. **Denotes Priority Weed*

Appendix B. Fauna species identified within and surrounding the Subject Property.

Class	Scientific Name	Common Name	Status
Aves	*Corvus coronoides*	Australian Raven	Protected
	Dacelo novaeguineae	Kookaburra	
	Sericornis frontalis	White Browed Scrub Wren	
	Rhipidura albiscapa	Grey Fantail	
	Gymnorhina tibicen	Australian Magpie	
	Anthochaera carunculata	Red Wattlebird	
Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo	

Appendix C. The Scots College Glengarry Campus Site Plans (Baxter Jacobson Architects 2024).



Appendix D. Proposed Additional APZ Management (Bushfire Hazard Solutions, 2024).

NARLA

environmental

Eastern Sydney Office
Suite 2.01 4/10 Bridge St
Pymble
NSW 2073
Ph: (02) 9986 1295

Western Sydney Office
7 Twenty-Fifth Avenue
West Hoxton
NSW 2171
Ph: 0414314859

Hunter Valley Office
10/103 Glenwood Drive
Thornton
NSW 2322
Ph: 0414314859

Ph: 02 9986 1295
www.narla.com.au